Barry Lawrence Ruderman
Antique Maps Inc.

7407 La Jolla Boulevard
La Jolla, CA 92037

www.raremaps.com

(858) 551-8500
blr@raremaps.com

Nova & Accuratissima Totius Terrarum Orbis Tabula Nautica Variationum Magneticarum Index Juxta Observationes Anno 1700 Habitas Constructa per Edm: Halley

Stock#: 35772gm
Map Maker: Ottens

Date: 1730 circa
Place: Amsterdam
Color: Hand Colored
Condition: VG
Size: 56 x 21.5 inches

Price: SOLD

Description:

Sir Edmund Halley's Foundational Map of the World – Early, Influential Use of Isogonic Lines

Edmund Halley's chart of the world is one of the most important world maps of the eighteenth century. The map is the first surviving map to show isogonic lines, or lines connecting points of equal magnetic variation in the oceans, a feature then considered of prime importance for determining longitude.

The world map is presented in a long-strip format of a Mercator projection, which Halley called a nautical projection. Eastern Asia and Australia are repeated, so as to better show the flow of the isogonic lines. These lines radiate over the Atlantic and Indian Oceans, but not the Pacific. A note in the Pacific explains his innovation and why the lines stop as they approach the world's largest ocean:

> The Curve lines which are drawn over the Seas in this Chart, shew the Variation of the Compass in all the known Seas, the double lines divide the tracts of East and West Variation & under them the Compass stands true without Varying. In any other place, the degrees of Variation is [sic.] seen by the number on the Line that passes over that place. I durst not presume to describe the like Curves in the South Seas wanting account thereof. (quoted from the English edition of Halley's chart, published by Emanuel Bowen, 1722).

While the isogonic lines are certainly a distinctive feature of this map, Halley also strove to include all the latest and most comprehensive geographic information, so that it would be of utmost use to the navigator. In the South Pacific is a half-hemisphere map of the North Pole. A helpful note explains, "That nothing might be wanting in this Chart we have added this Polar, partly to shew the Inclination of the Meridians toward the Pole, partly to avoid the too great contraction of our Scale" (ibid).

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Halley also includes several details that we now know are cartographic myths. California is shown as an island (see below). A tiny island near what is today Argentina is labeled as Pepys Island. Pepys was a contemporary of Halley's and had served as President of the Royal Society. This island was named in the 1680s by a buccaneer and lingered on maps for a century before naval explorers like Byron and Cook confirmed that it did not exist.

Another chimera is repeated twice in Northeast Asian waters. Mainland Asia fades out, giving way to the unfinished coastlines of *Terre de Iesso* and *Terre de la Compagnie*. Iesso, or Yesso, is a name for Hokkaido and its size was usually exaggerated on maps of this period. Compagnie's Land, and its neighbor, Staten Land, were mis-discoveries found while searching for another mythic island, Gamaland (see below).

There are decorative details tucked into the blank and inland spaces of the map. For example, a poem, in Latin, graces the North Pacific in a temple-style cartouche and lauds the unknown inventor of the maritime compass. A similar framed cartouche carries another Latin poem, this one praising the consolidation of maritime power by Queen Anne (a holdover from the English edition), in Russia. Muses carrying the instruments of astronomy, navigation, and cartography grace the title cartouche in North America.

While it was later learned that magnetic variation fluctuates with time and cannot be used to find longitude at sea, Halley's charts and his use of isogonic lines were considered an indispensable contribution to the study of navigation by savants and sailors alike. As Samuel Pepys asked rhetorically, "Mr Hawley—May he not be said to have the most, if not to be the first Englishman (and possibly any other) that had so much, or (it may be) any competent degree (meeting in them) of the science and practice (both) of navigation?" (as quoted in Thrower, 15).

<u>Halley's voyage and his charts</u>

Halley was a prolific publisher and his output included several important maps and charts, including his untitled world map of 1686 showing the trade winds. During the 1680s, Halley became increasingly concerned with the implications of magnetic variation for navigation. Not one to just read about a phenomenon, Halley sought command of a Royal Navy vessel, the *Paramore*, and took it on three voyages between 1698 and 1701. The first two, to the South Atlantic, were to study geomagnetism. The third, in the English Channel, focused on tidal phenomena. While his journals were not published during his lifetime, his charts from those voyages were.

The first chart he published was a chart of the Atlantic with isogonic lines, "A New and Correct Chart

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Shewing the Variations of the Compass in the Western & Southern Oceans as observed in ye year 1700 by his Ma/ties Command." Dedicated to William III, who died on March 8, 1702, the chart is usually dated to 1701, as Halley returned from his second voyage on September 18, 1700. It was printed by Richard Mount and Thomas Page of Tower Hilll and engraved by John Harris. He presented the chart to the Royal Society on June 4, 1701.

The chart of the world's oceans which Halley created, of which the present chart is an example, would prove more influential and grow to greater prominence, appearing in several states, foreign editions, and even updated revisions. It was the first printed world map to employ isogonic lines.

The chart first appeared in 1702, datable by the dedication cartouche in Africa that references "Prince George of Denmark, Lord High Admiral." The Prince Consort was elevated to that position on April 17, 1702.

The world chart contains fewer decorative details than the Atlantic chart, as well as a few additions. One of these is the Falkland Islands, which had been named as such by John Strong in 1690. Halley mentions Strong's journal in his own and this chart would help to fix that name to the archipelago.

Interestingly, although the world chart proved popular and was reissued, translated, and updated (see Montaine and Dodson's chart (1744) which extends the isogonic lines to the Pacific), the chart became scarce in all iterations over time. Indeed, by 1870, Halley's charts were so scarce that Sir George Airy, Astronomer Royal, exasperatedly exclaimed that, despite having seen references to "Halley's Magnetic Chart," he had "not ascertained that any writer had ever seen it…As I was desirous of making myself acquainted with a document so important in the history of magnetic science, I made enquiries in nearly every Academy in Europe, but could not find anywhere a copy of this Chart." He eventually did find an example of the world chart nearby, at the British Library; he seems not to have known of the existence of the Atlantic chart.

The present bilingual edition (French and Dutch) was issued by Reiner and Joshua Ottens in Amsterdam. It is widely considered to be the most visually attractive edition of the map. It is also rarely seen on the market, as are Halley's charts in general.

The history of geomagnetism

Humans have known for centuries that there was a magnetic property to metals, and to navigation. Polarity and orientation were first recorded in China in the sixth century; they also recorded the first

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known compasses, a needle floating in a bowl of water, in the twelfth century. This technique for finding direction was also developed in Europe in the Medieval period. The first maps to include an inkling of declination are markings on German sundials from the mid-fifteenth century. Soon mapmakers adopted the convention, including declination markings on their wind roses.

Until the sixteenth century, the seat of magnetic attraction was thought to be housed in the heavens. In the early modern period, more and more data was gathered. This data was collected by navigators at sea and consisted of magnetic inclination, declination, and deviation. The former, also known as magnetic dip or the dip angle, is the angle made with the horizontal by the Earth’s magnetic fields. Magnetic declination, or variation, is the angle on a horizontal plane between magnetic and true north. Magnetic deviation is the effect of local magnetic fields on compass error. Directional data led savants to conclude that these phenomena varied considerably based on one’s location. They found there was terrestrial polar attraction, creating waves, or lines, of magnetic variation across the globe.

More information also shifted understanding of the source of magnetic variety. As more and more ships took to the open seas, they contributed new data sets. Many found magnetic declination to be zero near the Azores, suggesting that it was a natural prime meridian from which to measure longitude. A tilted dipold was thought to lie 180°E of the Azores, affected by the great magnetic mountain that supposedly lay in the Arctic—it appears famously on Mercator’s map of the North Pole. While this idea was mistaken, as were other hypotheses of two and up to six dipolds, the ideas of an Earth-bound source for magnetism, and of terrestrial locations for the magnetic poles, were not.

The first map to show isogonic lines—lines connecting points of equal declination—was a manuscript chart by the Jesuit Christoforo Borro; made in the 1620s, it is now lost. The seventeenth century was an important period in the theorization of geomagnetism; William Gilbert and others contributed to the ideas of global crustal heterogeneity, rather than a single Arctic magnetic pole. Observations conducted over time at a single point also showed that there was a temporal element to magnetic readings. Precisely why these changes occurred was what drove Edmond Halley to conduct the first naval surveys of magnetic declination in the 1690s.

In the eighteenth century, isogonic lines such as those employed by Halley on his influential charts in the early 1700s would become a useful tool for those eager to crack the secrets of geomagnetism. They appeared on maps by Frezier (1717), Van Musschenbroeck (1729, 1744), van Ewyk (1752), Mountaine and Dodson (1744, 1756), Dunn (1775), Lambert (1777), and Le Monnier (1778). The first map to include isoclinics, or lines of equal dip, was made by Johann Karl Wilcke in 1768. Towards the end of the century,

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John Churchman, a surveyor, published a magnetic atlas that employed both isogonics and isoclinics. They called on a huge amount of data gathered on shore by national observatories and local natural philosophers, as well as at sea by naval officers and trade company employees. All of this information led to the abandonment of the idea of even multiple fixed poles and gave way to an understanding of shifting magnetism based on disjointed dipoles that were dynamic, tilted, and nonantipodal.

From the 1830s, astronomers and physicists became the primary gatherers of data. They measured the full magnetic vector; that is, they recorded both the direction and intensity of magnetism. These surveys allowed them to map the field as a whole, a process that accelerated in the mid-twentieth century when scientists were able to carry out various magnetohydrodynamic simulations.

Detailed Condition:
Old Color. Minor marginal soiling and abrasions.